FRD ACTIVITIES REPORT
January - March 2012

RESEARCH PROGRAMS

NOAA/DOE Wind Forecast Improvement Project

The WFIP sites in Texas maintained by FRD were visited twice during the quarter, once in the first week of January and the other in the last full week of February. The ASC sodar at Brady had a weak signal prior to the January visit and was underperforming as a result. The speaker array was replaced with a loaner unit from ASC at that time. The loaner unit was subsequently replaced with the repaired original unit during the March visit with essentially no downtime as a result. A few brief communications problems were quickly resolved and all other maintenance activities were routine.. With the exception of a few periods affected by precipitation, there was only minimal data loss for the Brady radar profiler and the sonic and sodar measurements at all three sites during the quarter. (dennis.finn@noaa.gov)

Extreme Turbulence (ET) Probe

FRD has as yet received no funding for ET probe activities this fiscal year. Since this may be the last year of NOAA funding, any money that does come in will likely be used for data analysis and publication rather than additional field deployments (richard.eckman@noaa.gov, Roger Carter, Tom Strong, Shane Beard)

HRRR Collaboration with ESRL

FRD continues to receive a subset of HRRR output centered over Southeast Idaho but has also been receiving a second subset centered over Texas. The Texas subset was configured for wind-energy measurements collected by ATDD as part of an agreement with Duke Energy. With FRD's involvement in WFIP, there is now an opportunity to compare the Texas HRRR forecasts with data from the three WFIP stations. However, the original subset did not cover all the WFIP stations. The boundaries of this subset have now been adjusted to cover both the original ATDD station and all the WFIP stations. ATDD is using software originally developed for the Duke Energy collaboration to compare the WFIP wind observations with the HRRR forecasts. (richard.eckman@noaa.gov, Dennis Finn, Will Pendergrass [ATDD])

High Performance Computing

A project meeting was held on 16 March between FRD staff and Dr. Inanc Senocak, from Boise State University, and his graduate student, Danny George. They have determined that the current structure of HYSPLIT is poorly suited for parallel computing utilized by GPUs and that improvements in computing efficiencies that might be gained with the utilization of GPU processing are relatively minimal. For most of the functions, much of the savings in time that might be realized by porting to GPUs are lost due to

excessive copying requirements. Our BSU colleagues are instead proceeding with developing a general purpose Lagrangian dispersion kernel that will be optimized for parallel processing with GPUs. This kernel could possibly be implemented in HYSPLIT and other geophysical dispersion models. (dennis.finn@noaa.gov, Rick Eckman, Kirk Clawson, Roger Carter)

High Desert Prairie Grass, aka Prairie Grass II

FRD is giving consideration to conducting an atmospheric dispersion study to re-measure the dispersion parameters determined by the 1956 Prairie Grass study. Since its completion in 1956, the results of the Prairie Grass study have been used as the basis of many, if not most, atmosphere dispersion calculations and model development. However, the results of recent dispersion experiments conducted at the INL differ from the Prairie Grass results. It may be that the dispersion over the high desert steppe of the INL is somewhat different than the Nebraska prairie where the original Prairie Grass study was completed. If so, this should be accounted for in the models and calculations done for the INL and for other locations with similar land and meteorological conditions. FRD is studying the feasibility of conducting a study similar to Prairie Grass but using modern equipment and procedures. Due to budgetary constraints, the project would have to be spread over several years and designed carefully to use the available funding as efficiently as possible. We are considering experiment design, methods of economically increasing the spatial resolution of our sampling, and how we can repair or extend the life of our sampling bags to make the project feasible. (everyone)

Transport and Dispersion Modeling

A formal protocol was adopted for testing all facets of the NOAA/INL EOC HYSPLIT implementation (EHY version 1.0). The protocol includes testing of: 1) all preconfigured scenarios in the library; 2) all possible combinations of selecting model configuration parameters to make sure the model will execute reliably; and 3) utilities and features such as printing, saving, sharing runs, and accessing old runs. The testing is being conducted by both meteorologists and non-meteorological staff with the goal to make the implementation as robust and user-friendly as possible regardless of the skill of the user. (roger.carter@noaa.gov; dennis.finn@noaa.gov)

Progress continued toward an upgrade of EHY from version 1.0 to 1.1. The upgrade will include: 1) calculation of specified derived intervention levels (DILs); 2) provisions for using either preconfigured release scenarios or fully user-customized scenarios; 3) the use of a gray scale contour for showing the extent of the plume at levels below regulatory limits; and 3) improved labeling of nuclides, release scenario, and time on graphical output. Testing of the 1.1 prototype is currently being conducted through the web interface. Some preliminary work has been completed on version 2.0, which will include the ability to configure multiple sources and run plume animations, among other features. (dennis.finn@noaa.gov; brad.reese@noaa.gov)

Preliminary work is in progress on potentially adopting two additional meteorological models for EHY. One model would utilize the NOAA/INL mesonet data, a feature that is already incorporated into EHY, but the proposed additional model would provide for mass consistent flow. The other model would utilize mesonet observations to nudge WRF modeling. (roger.carter@noaa.gov; richard.eckman@noaa.gov)

Encouraged by the failing disk on the operational HYSPLIT server, a new Microway server with Nvidia GPUs was set up as the server for EHY. The new server utilizes a faster compiler and completes the HYSPLIT runs significantly faster - up to 10 times faster in some cases - than the previous server. A number of minor incompatibilities in the operating system and compiler had to be worked through to get

the system operational, the most difficult being a compiler error that was solved when a new upgrade to the compiler was released. (roger.carter@noaa.gov; richard.eckman@noaa.gov;dennis.finn@noaa.gov; brad.reese@noaa.gov)

Mesoscale Forecast Modeling

The FRD computer that was running the WRF forecasts for Southeast Idaho failed suddenly in March. It had been running continuously for about five years. Fortunately, a new WRF forecast system was nearly ready to go at FRD. The new system uses WRF-ARW version 3.3.1 and a 3 km spacing for its horizontal grid. Another change is that the new forecasts go out 18 hours compared with 12 hours in the old system. Currently the Rapid Update Cycle (RUC) is used for initial and boundary conditions in the new WRF forecasts, but the Rapid Refresh (RAP) will be used once it becomes operational (scheduled for May 2012). As was true with the old WRF forecasts, the wind forecasts generated by the new system appear to be superior over Southeast Idaho to those from HRRR. (richard.eckman@noaa.gov)

Flux Station Analysis

Work continued on the evaluation and analysis of the database from the NOAA/INL Grid3 flux station for the period 2007 to present. This includes identification of problems in the database and refinements of the appropriate software for quality control purposes and the correction of fluxes. (dennis.finn@noaa.gov; jason.rich@noaa.gov)

NOAA/IDAHO NATIONAL LABORATORY (INL) METEOROLOGICAL RESEARCH PARTNERSHIP

Emergency Operations Center (EOC)

A Team C drill was conducted on 10 January that simulated a small radioactive release at the MFC facility on the INL. The HYSPLIT model was successfully used to configure the release and create the resulting plume. (dennis.finn@noaa.gov)

Team D had a drill on 21 March. It simulated an accidental vehicle explosion at CFA involving injuries. Small quantities of sulfuric acid were involved, but not enough to require running either HYSPLIT or ALOHA. (richard.eckman@noaa.gov)

INL Hazardous Weather Alert System

Despite the drier and warmer than average winter, 16 weather statements were issued from the NOAA INL Weather Center during the last quarter. All of the weather statements issued were due to high winds. Most of the statements were issued when the Pocatello National Weather Service did not issue any warning or advisory, since their criteria for warning the general public is less stringent than the INL. The high number of high winds statements was unusual for the months of January and February.

On Saturday March 31, the INL Warning Communication Center paged the on-call meteorologist for guidance on high winds that were expected on the INL that day. A verbal forecast was a given to WCC. However, since the National Weather Service had already issued a High Wind Warning no further action was needed by the NOAA INL Weather Center since the INL was already covered in the NWS warning. (Jason.rich@noaa.gov; dennis.finn@noaa.gov)

NOAA/INL Mesonet

FRD is always working to improve the efficiency of the mesonet observations quality control process. Because of this continual effort, the automatic quality control system has now been upgraded to automatically set flags on upper level temperature measurements whenever the 2-meter temperature is flagged or missing. The upper level temperatures are calculated by adding a thermocouple measured temperature difference to the 2-meter temperature. Without a valid 2-meter temperature, the upper level temperatures are also invalid. Previously, these flags had to be set manually.

A new algorithm to detect spikes in the 2-meter temperature record has been developed and is being tested. These spikes have always been flagged manually. They appear as an elevated 5-minute maximum temperature that is collected along with the average 5-minute temperature. There are a number of factors that must be considered when determining if a particular data point is likely to contain spikes and should, therefore, be flagged. This makes the process difficult to automate and also time consuming for the meteorologist doing the quality control data review. The new algorithm was able to match the meteorologist review over 90% of the time in initial tests. It is currently producing a daily list of points to be flagged that are compared to the manually flagged points. If it proves sufficiently accurate, it will be allowed to set the database flags and reduce the effort required to complete the daily quality control review. (roger.carter@noaa.gov, jason.rich@noaa.gov)

Last fall, a capability was added to the NOAA/INL Weather Center website to allow users to extract and download data directly from the NOAA/INL Mesonet database. The initial capability permitted access to the most recent three years of data. In March, the capability was upgraded to improve its operation and to allow access to the entire NOAA/INL mesonet database collected since 1994. This is the year that online access of real-time NOAA/INL mesonet data began. (brad.reese@noaa.gov; roger.carter@noaa.gov)

OTHER ACTIVITIES

Safety

 In January, Dennis Finn replaced Jason Rich as a member of the FRD safety team.

The Fire Inspector with the Idaho Falls Fire Department completed a fire inspection of our facility. The few reported minor-impact items have been addressed (e.g., light bulbs in exit signs, height of smoke alarms, etc.).

January's staff meeting included on-line games to remind employees of how to properly drive on ice and other defensive driving techniques.

A video on office safety was presented at the February staff meeting.

Dennis Finn provided an excellent video of Japan Earthquake of 2011 and the affects to the Fukushima's Nuclear Power Plant and resulting aftermath.

Training

Donna Davis completed the required 40 hours of training to re-certify her current Contracting Officer Representative certificate.

All employees completed the required 2012 Annual Security Briefing for Un-cleared Employees for INL.

Rick Eckman traveled to Shepherdstown, WV at the end of February to attend the second OAR Leadership Effectiveness and Advancement Program (LEAP) training session.

Travel

Tom Strong traveled to San Antonio, TX from January 4-6 to service the equipment at the three WFIP sites. He retrieved data cards from the sonic anemometers and perform general maintenance.

Kirk Clawson traveled to New Orleans, LA from January 22-27 to attend the annual AMS meeting.

Rick Eckman traveled to Washington D.C. from February 27-March 2 to attend Leadership Effectiveness and Advancement Program (LEAP) training. During the same trip he gave a presentation on FRD's activities to the new OAR Assistant Administrator Robert Detrick.

Outreach

Part of Rick Eckman's LEAP training involves participation in a nine-person team looking into workplace civility. Prior to the February meeting this team put together a civility survey that went out to all LEAP participants. About half the respondents reported that workplace incivility was a problem, with 38% stating that incivility had led them to look for another job within the past five years. The top four uncivil behaviors reported were ignoring coworkers, taking credit for others' work, managers discounting employee contributions, and abusive language. The team intends to develop civility training materials for OAR. (richard.eckman@noaa.gov)